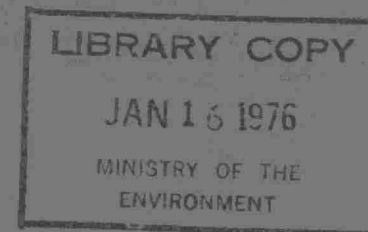


# OPERATING SUMMARY

CITY OF  
**THUNDER BAY**  
WATER POLLUTION CONTROL PLANTS

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MINISTRY OF THE ENVIRONMENT



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REGIONAL OPERATIONS DIVISION

DIRECTOR, NORTHWESTERN REGION  
L. Pitura

MANAGER, UTILITY OPERATIONS  
I. Munro

THUNDER BAY  
WATER POLLUTION CONTROL PLANTS

operated for

THE CITY OF THUNDER BAY

by the

MINISTRY OF THE ENVIRONMENT

1974 ANNUAL OPERATING SUMMARY

prepared by

Plant Performance Unit

TECHNICAL SERVICES BRANCH

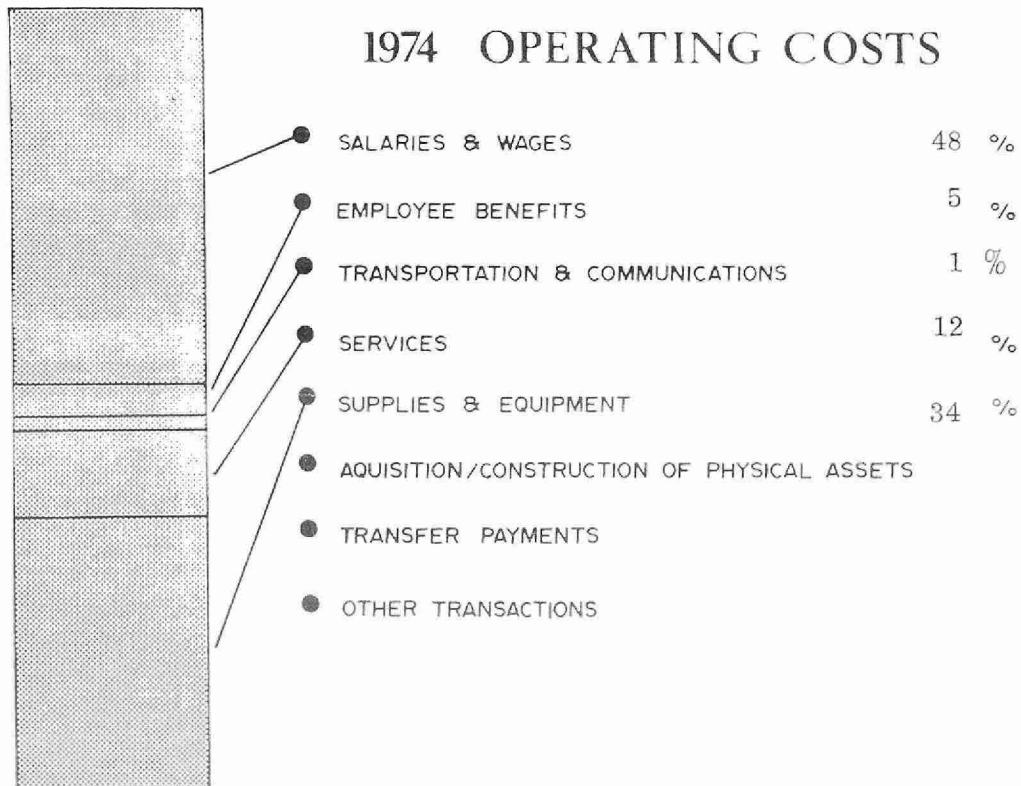
T. Cross, Director

## CONTENTS

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# ANNUAL COSTS

## 1974 OPERATING COSTS



## YEARLY OPERATING COSTS

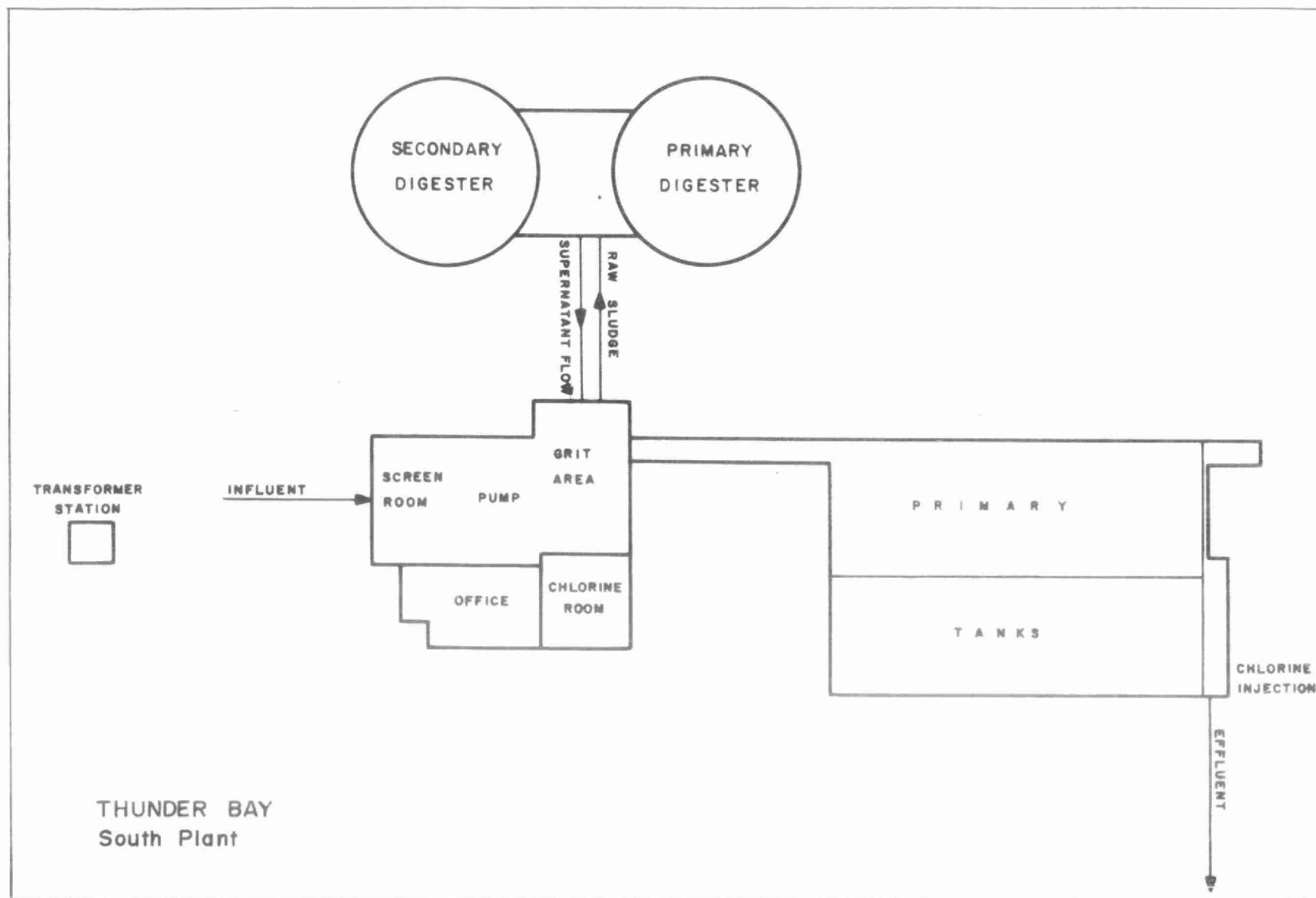
YEAR	SEWAGE TREATED in million gallons	TOTAL OPERATING COSTS	UNIT COSTS	
			\$/M.G.	¢/lb BOD
1974	4,464.0	224,829	50	16

# OPERATING EXPENDITURES

Regular Staff	\$ 104,005	\$
Casual (Unclassified) Staff	<u>3,417</u>	
TOTAL SALARIES AND WAGES		<u>107,422</u>
TOTAL EMPLOYEE BENEFITS		<u>11,042</u>
TOTAL TRANSPORTATION AND COMMUNICATIONS		<u>1,757</u>
Insurance	<u>7,614</u>	
Sludge Haulage	<u>14,791</u>	
Repairs and Maintenance	<u>4,486</u>	
Other Services	<u>1,059</u>	
TOTAL SERVICES		<u>27,950</u>
Machinery and Equipment	<u>5,033</u>	
Chemicals	<u>23,967</u>	
Utilities	<u>37,125</u>	
Other Supplies and Equipment	<u>10,533</u>	
TOTAL SUPPLIES AND EQUIPMENT		<u>76,658</u>
TOTAL AQUISITION/CONSTRUCTION OF PHYSICAL ASSETS		<u>          </u>
TOTAL TRANSFER PAYMENTS		<u>          </u>
OTHER TRANSACTIONS		<u>          </u>
GRAND TOTAL	GRAND TOTAL	\$ <u>224,829</u>



SOUTH PLANT





# DESIGN DATA

PROJECT Thunder Bay S. WPCP

PROJECT NO. 2-0091-61

TREATMENT Primary

DESIGN FLOW 6.0 mgd

DESIGN POPULATION 48,000

## PRIMARY TREATMENT

### Screening

- Trash Racks  
Type: Jeffrey  
Size: Two with 3" spacing
- Grinder  
Type: Jeffrey (One)
- Coarse bar screens  
Type: David Brown  
Size: Two with 1" spacing

### Sewage Lift Pumps

Type: Fairbanks-Morse  
Size: Two 5140 gpm @  $36\frac{1}{2}$ ' tdh  
Two 3490 gpm @  $36\frac{1}{2}$ ' tdh  
(variable speed, electric)

### Grit Removal

Type: Aerated; grit removed by  
clamshell bucket  
Size: One 29' x 25' x 15' deep  
Retention: 1.5 min

### Primary Sedimentation

Type: Jeffrey  
Size: Two 132' x 37' x 10' avg  
(622,000 gal)

Retention: 2.5 hours  
Loading: Surface, 600 gal/ft<sup>2</sup>/day  
Weir, 10,000 gal/ft/day

## CHLORINATION

W & T

### Chlorine Contact Chamber

- in effluent chamber

## OUTFALL

- to Kam River

## SLUDGE HANDLING

### Digestion System

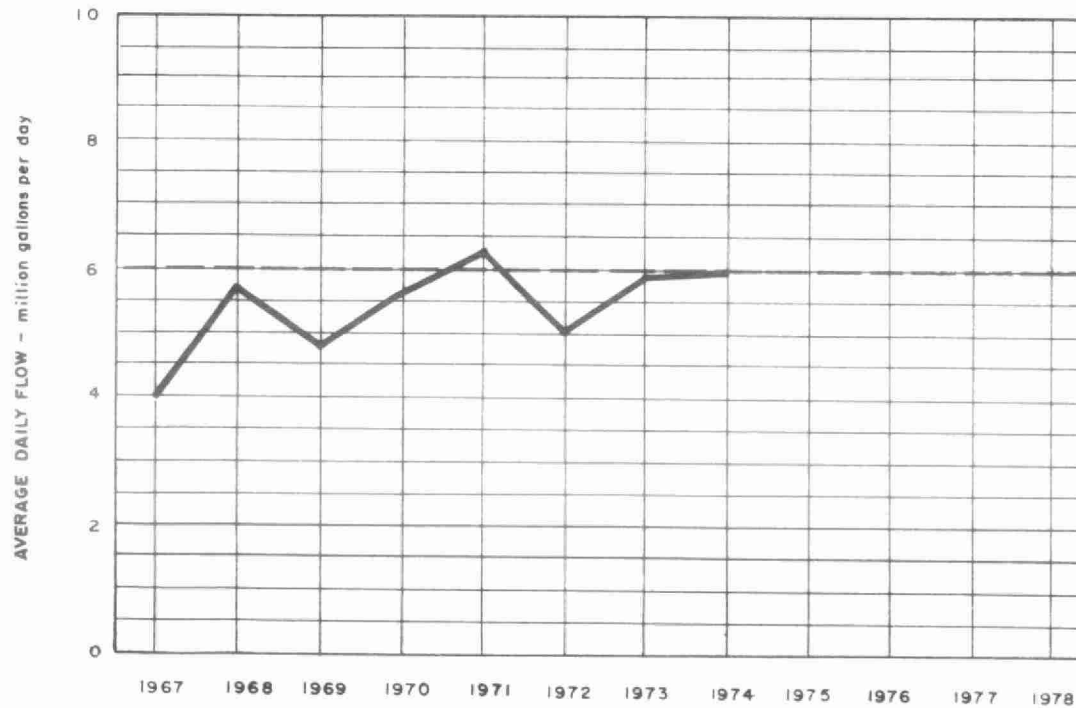
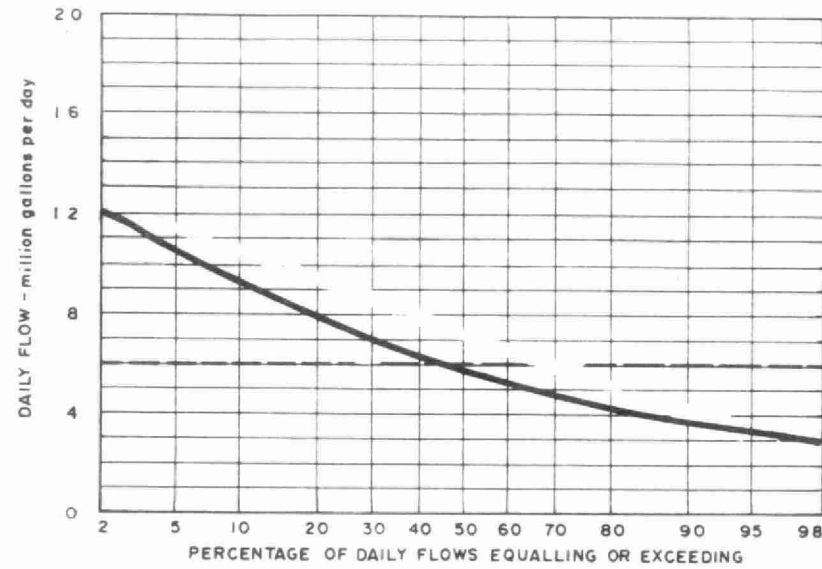
Type: Two-stage

Primary --  
Type - Gas mixed PFT  
Size - One 60' dia (71,000 cu ft or  
442,000 gal)  
Loading - 3.0 lb/ft<sup>3</sup>/mo

Secondary --  
Size - One 60' dia (71,000 cu ft or  
442,000 gal)  
Total Loading - 1.5 lb/ft<sup>3</sup>/mo

# PROCESS DATA

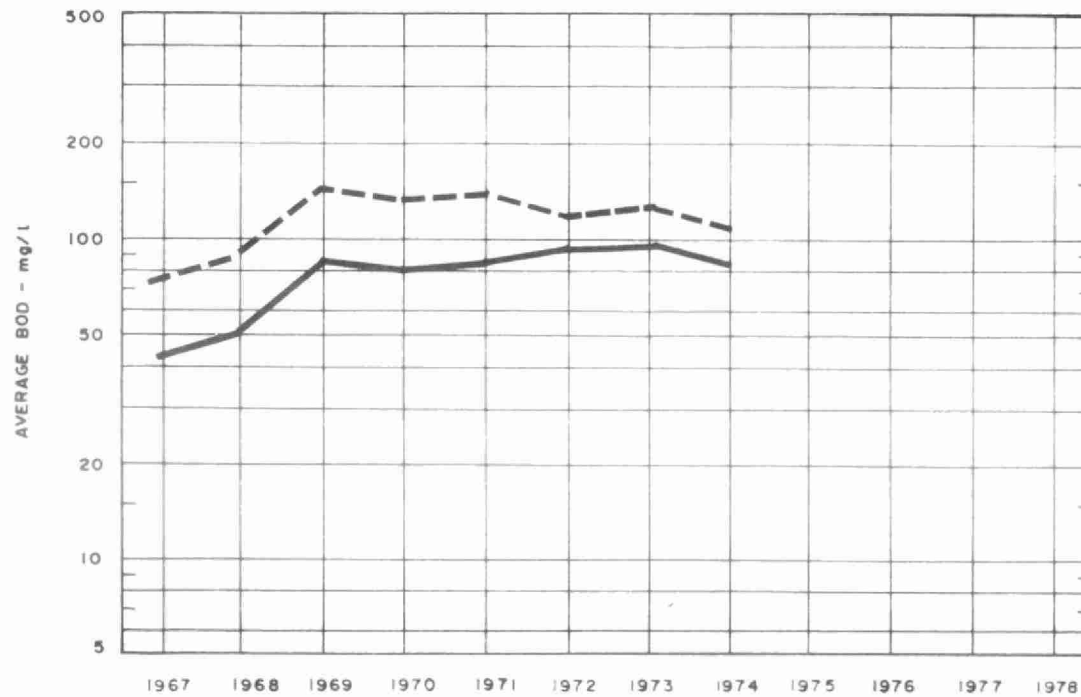
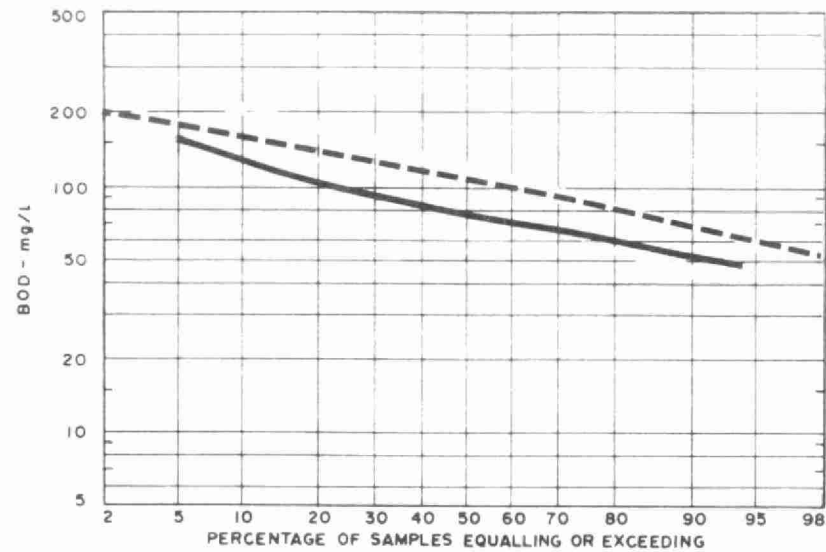
# FLOWS



## PLANT PERFORMANCE

MONTH	FLOWS			BIOCHEMICAL OXYGEN DEMAND				SUSPENDED SOLIDS				PHOSPHORUS	
	TOTAL FLOW million gallons	AVERAGE DAY mil. gal	MAXIMUM DAY mgd	INFLUENT mg/l	EFFLUENT mg/l	REDUCTION		INFLUENT mg/l	EFFLUENT mg/l	REDUCTION		INFLUENT mg/l P	EFFLUENT mg/l P
						%	10 <sup>3</sup> pounds			%	10 <sup>3</sup> pounds		
JAN	129.70	4.18	4.3	140	115	18	32	115	57	50	75	3.8	3.6
FEB	109.71	3.92	4.2	159	132	17	30	146	72	51	81	4.8	4.3
MAR	128.39	4.14	7.6	135	94	30	53	152	68	55	108		
APR	226.57	7.55	14.6	96	83	14	29	137	74	46	143	4.6	4.3
MAY	270.28	8.72	15.9	91	82	10	24	101	85	16	43	3.5	3.1
JUNE	231.81	7.73	11.9	110	85	23	58	142	77	46	151	3.7	2.2
JULY	211.33	6.82	12.0	86	75	13	23	235	67	71	355	2.6	2.1
AUG	199.70	6.44	10.4	88	74	16	28	102	71	30	62	6.1	3.4
SEPT	174.01	5.80	9.6	120	90	25	52	129	70	46	103	5.1	3.3
OCT	176.94	5.70	7.2	103	65	37	67	114	62	46	92	3.1	2.9
NOV	187.57	6.25	9.3	102	75	26	51	90	61	32	54	3.5	2.9
DEC	151.23	4.91	5.2	124	79	36	68	112	65	42	71	4.9	3.9
TOTAL	2197.24	-	-	-	-	-	571	-	-	-	1450	-	-
AVG.		6.01	MAXIMUM 15.9	114	88	23	48	134	68	49	121	4.1	3.2
No. of Samples	-	-	-	57	57	-	-	58	58	-	-	11	11

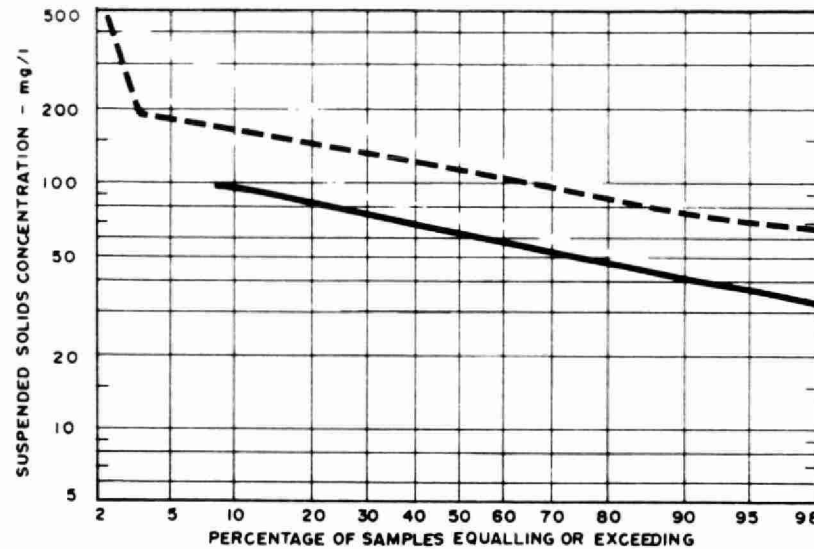
# BIOCHEMICAL OXYGEN DEMAND



PLANT INFLUENT      - - - - -

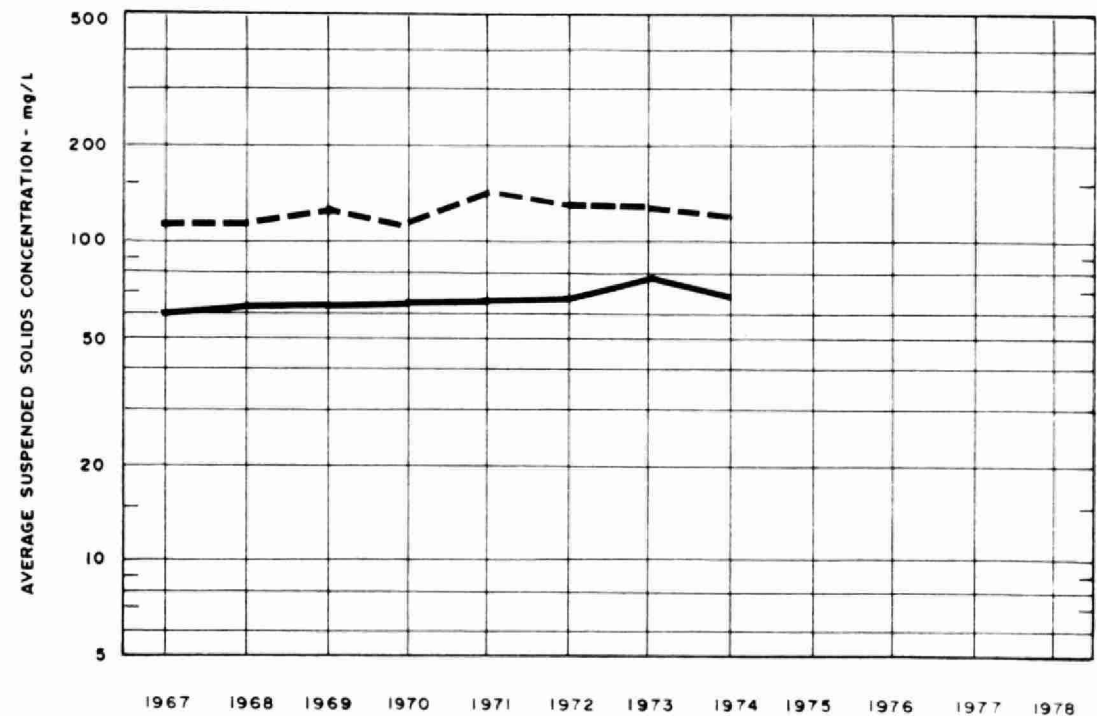
PLANT EFFLUENT      \_\_\_\_\_

# SUSPENDED SOLIDS

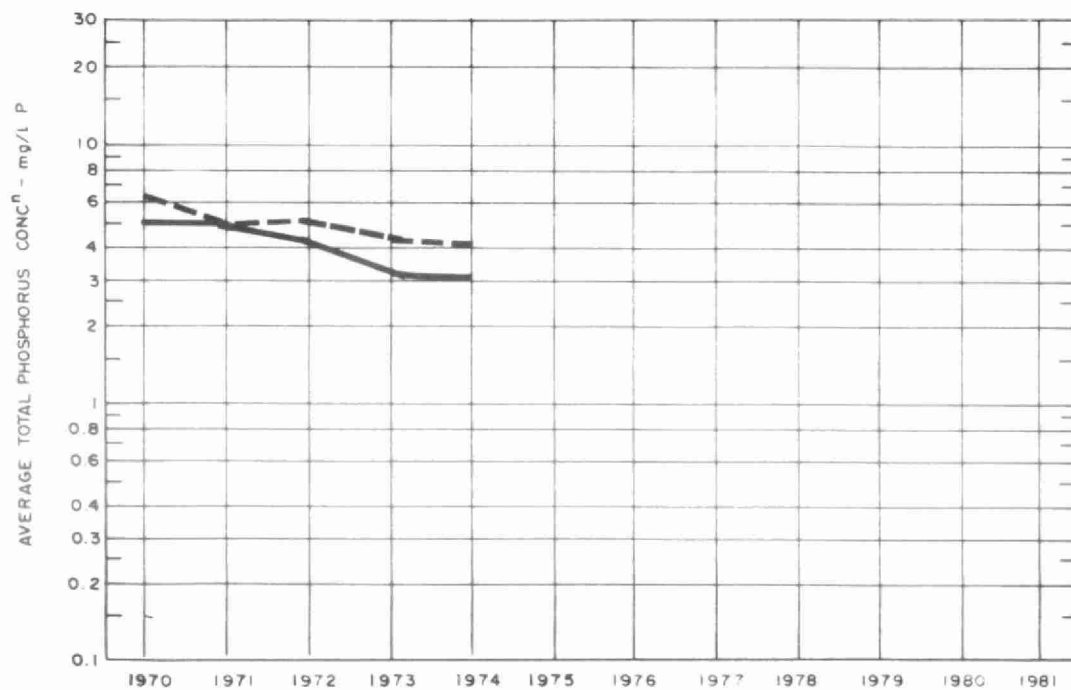
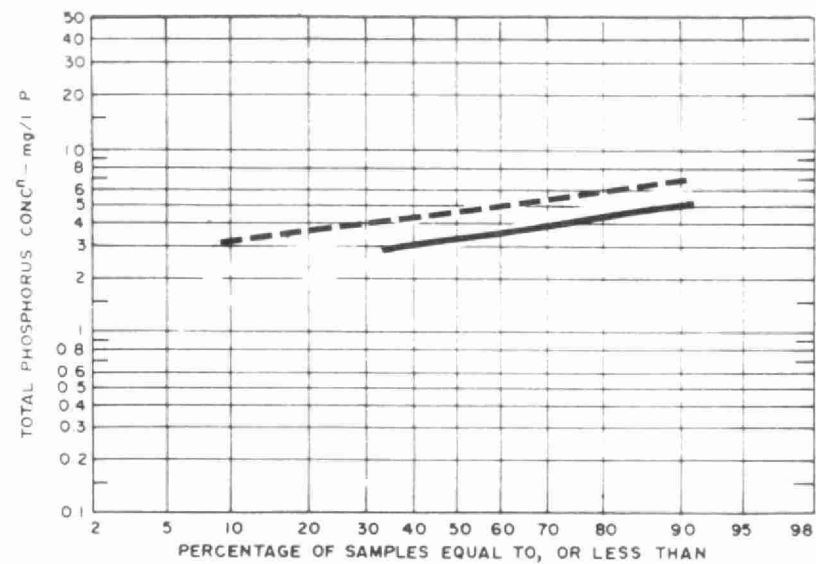


PLANT INFLUENT      - - - - -

PLANT EFFLUENT      \_\_\_\_\_



# PHOSPHORUS

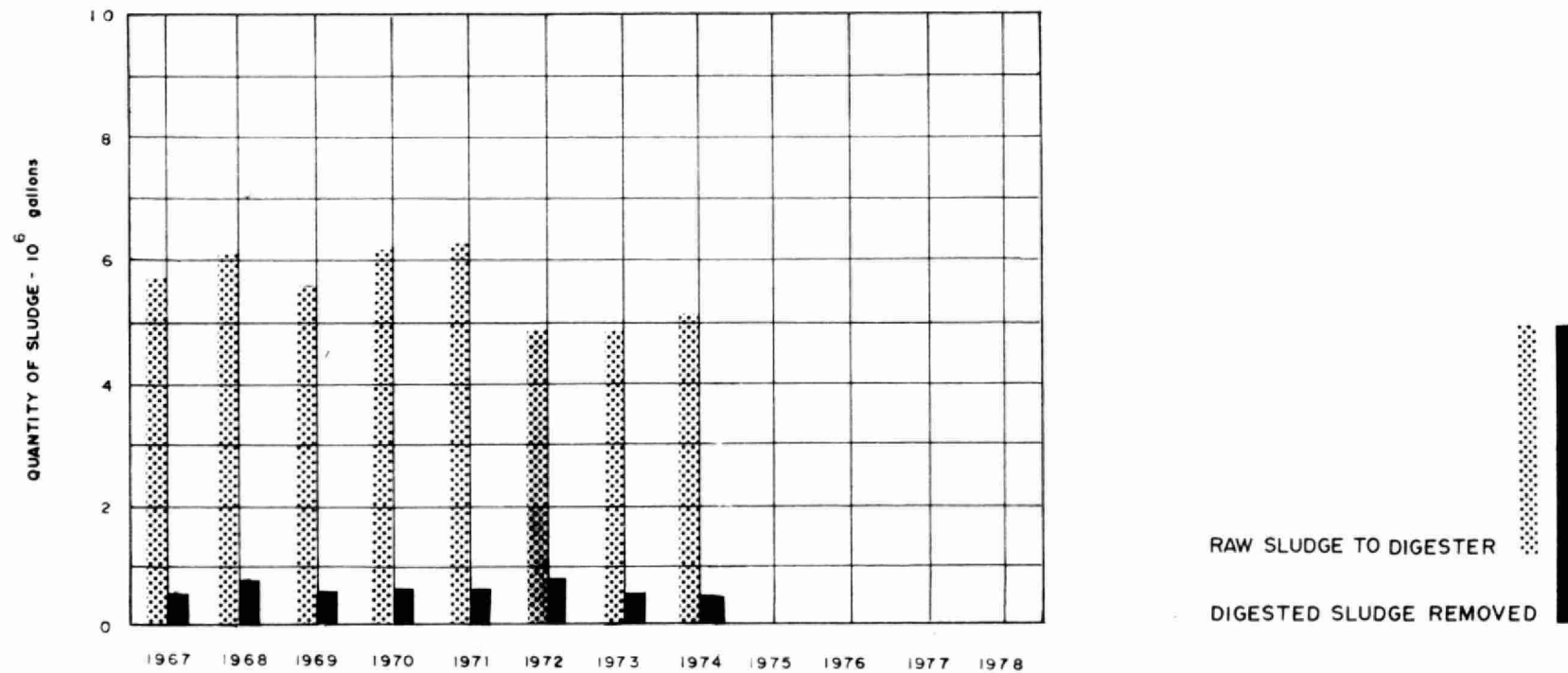
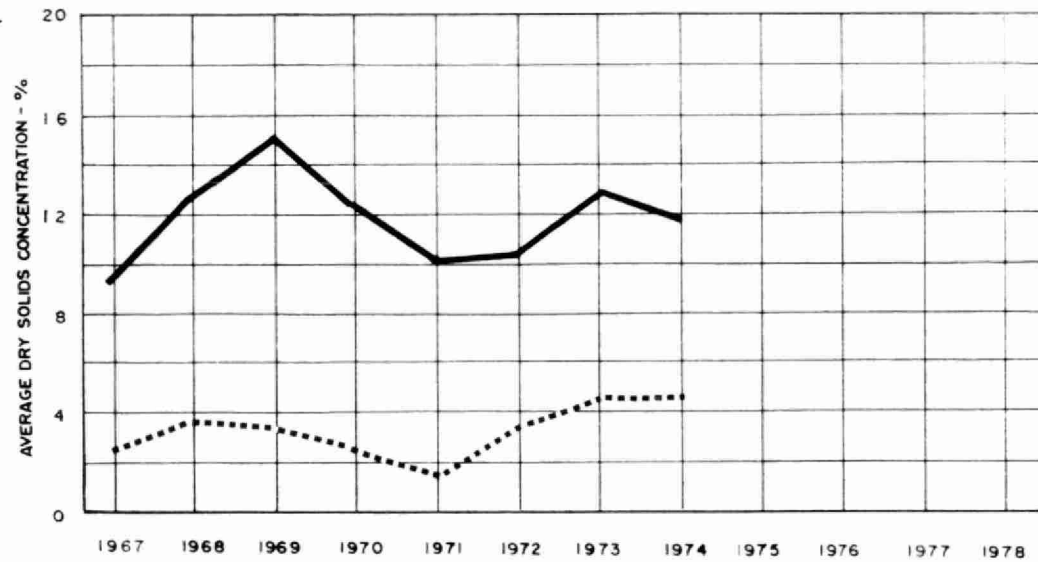


PLANT INFLUENT - - - - -

PLANT EFFLUENT —————

# DIGESTION

RAW SLUDGE .....  
DIGESTED SLUDGE ———



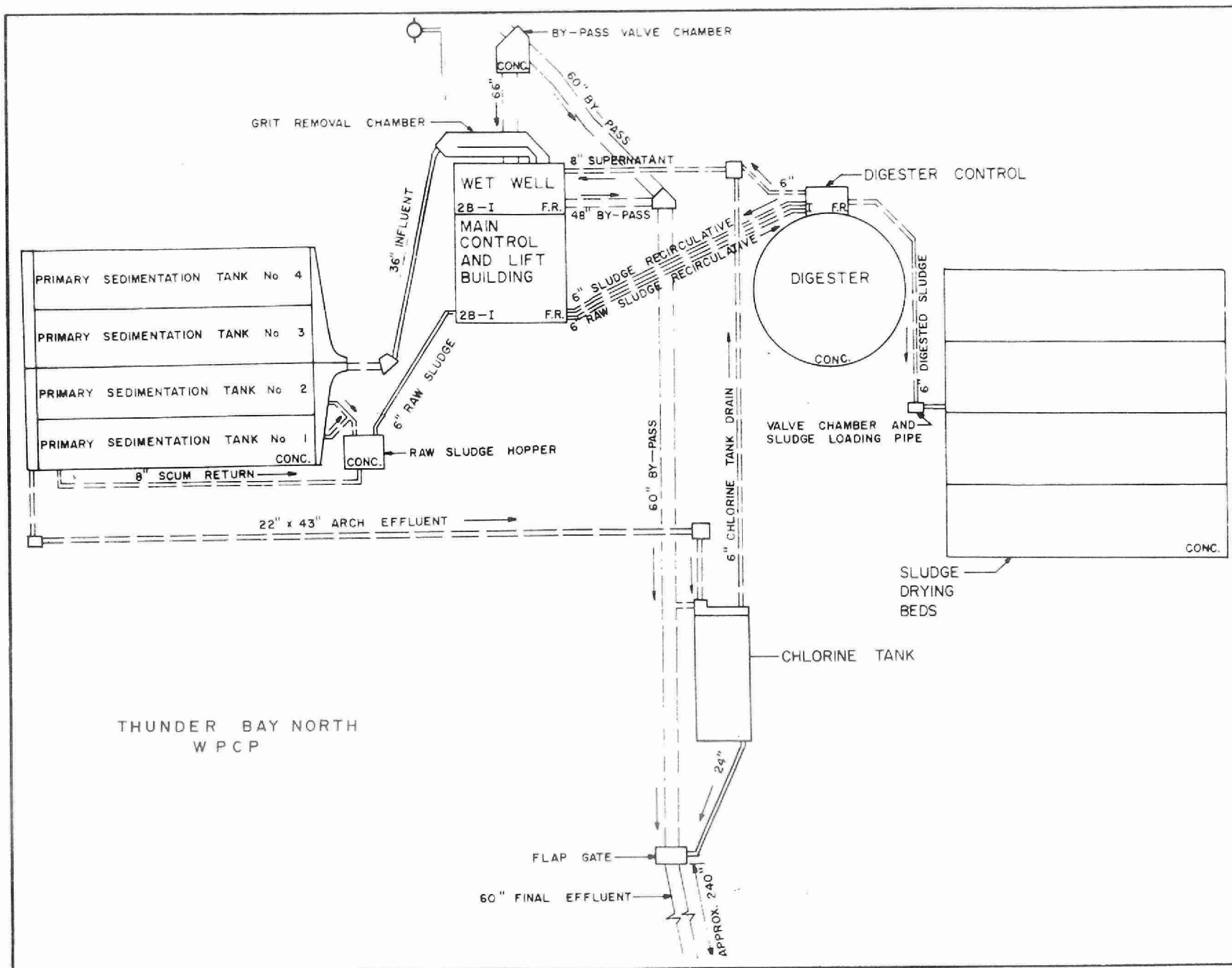
## TREATMENT DATA

MONTH	GRIT	CHLORINATION		SLUDGE DIGESTION and DISPOSAL							
	QUANTITY REMOVED cubic feet	CHLORINE USED 10 <sup>3</sup> pounds	AVERAGE DOSAGE mg/L	RAW SLUDGE			DIGESTED SLUDGE			SUPERNATANT	SLUDGE HAULED cubic yards
				QUANTITY 10 <sup>3</sup> gallons	TOTAL SOLIDS %	VOLATILE SOLIDS %	QUANTITY REMOVED 10 <sup>3</sup> gallons	TOTAL SOLIDS %	VOLATILE SOLIDS %	TOTAL SOLIDS %	
JAN	247	6.8	5.2	330	3.1	80	33	16.7	28		198
FEB	166	5.3	5.4	250	3.0	80	45	10.2	46	.2	264
MAR	321	5.4	4.6	314			6				33
APR	462	6.3	2.8	551	6.2	60	0	15.9		.5	0
MAY	370	7.0	2.6	389	5.2		0	11.8		.5	0
JUNE	370	6.8	2.9	358	5.6		41	10.9		.3	242
JULY	316	7.5	3.6	431	5.2		7	20.8		.3	44
AUG	500	7.6	3.8	486	4.7	59	0	18.4	30	.2	0
SEPT	540	7.6	4.4	585	4.3	74	69	8.1	37		407
OCT	330	8.0	4.5	516	4.3	70	130	10.9	36	.2	770
NOV	390	8.2	4.4	552	5.2	44	100	8.1	40	.1	594
DEC	293	7.7	5.1	445	3.8	76	22	10.8	73	1.5	132
TOTAL	4305	84.2	—	5207	—	—	453	—	—	—	2684
AVG.	2.0 cubic feet/mil gal	7.0	3.8	434	4.2	45	38	11.8	41	.3	224





**NORTH PLANT**



# DESIGN DATA

PROJECT Thunder Bay N. WPCP

PROJECT NO. 2-0013-58

TREATMENT Primary

DESIGN FLOW 4.0 mgd

DESIGN POPULATION 40,000

## Grit Removal

Type: Channels; mechanically cleaned  
(Rex San.)  
Size: Two 35' x 3' x 5' deep (6,540 gal)  
Retention: 4.7 min (two channels)  
Flow Velocity: 0.248 fps

## Comminution

Type: Barminutor  
Size: One Model B (35")  
One Model A1 (48")

## Sewage Lift Pumps

- a) Type: Chicago Pumps (ele)  
Size: Two 4150 gpm @ 50' tdh
- b) Type: Fairbanks-Morse (diesel)  
Size: One 29,000 gpm @ 33' tdh

## Primary Sedimentation

Type: Jeffrey  
Size: Four 100' x 18' x 8' deep  
(356,000 gal)  
Retention: 2.14 hr

Loading: Surface, 560 gal/ft<sup>2</sup>/day  
Weir, 6,000 gal/ft/day

## CHLORINATION

Type: W & T  
Size: One 500 lb/day

## Chlorine Contact Chamber

Size: 45' x 20' x 10'  
Retention: 20 min

## OUTFALL

- 240' of 60" dia corrugated pipe to McIntyre River

## SLUDGE HANDLING

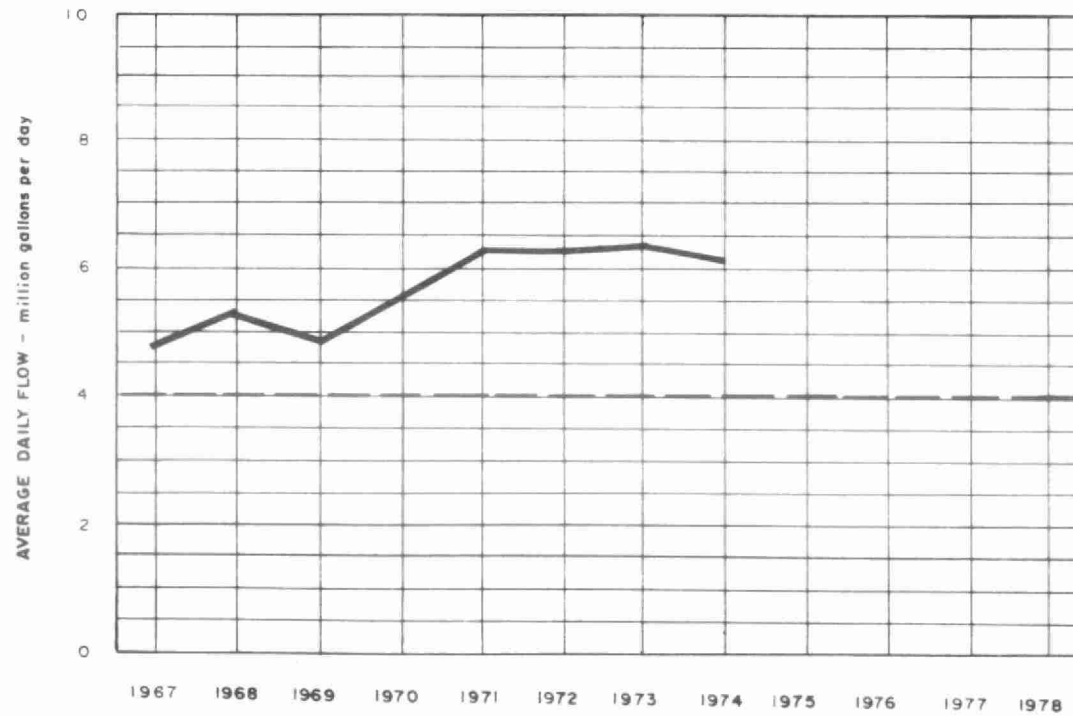
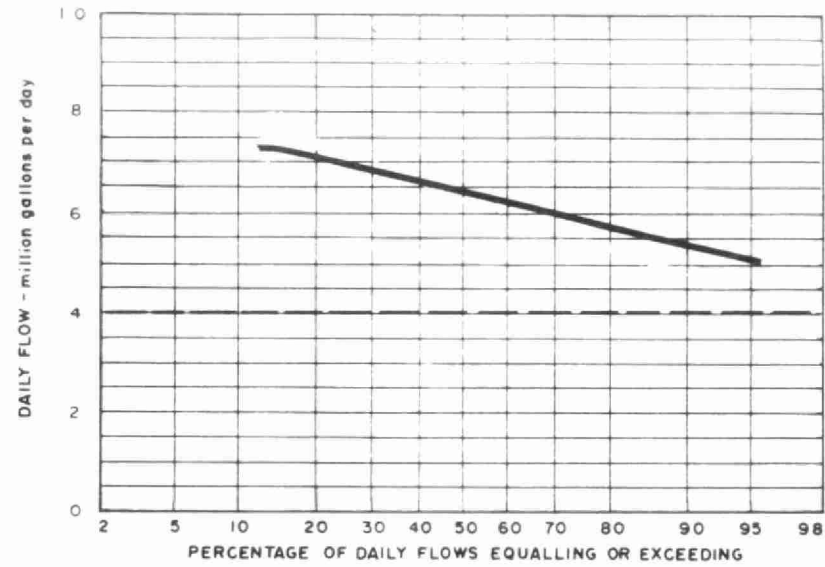
### Digestion System - Single-stage

Type: Mixed by recirculation; floating cover  
Size: One 50' dia x 20' swd (50,000 cu ft or 0.312 mil gal)  
Loading: 2.0 lb/cu ft/mo

## Drying Beds

Size: Four 100' x 25' (10,000 sq ft)

# PROCESS DATA FLOWS

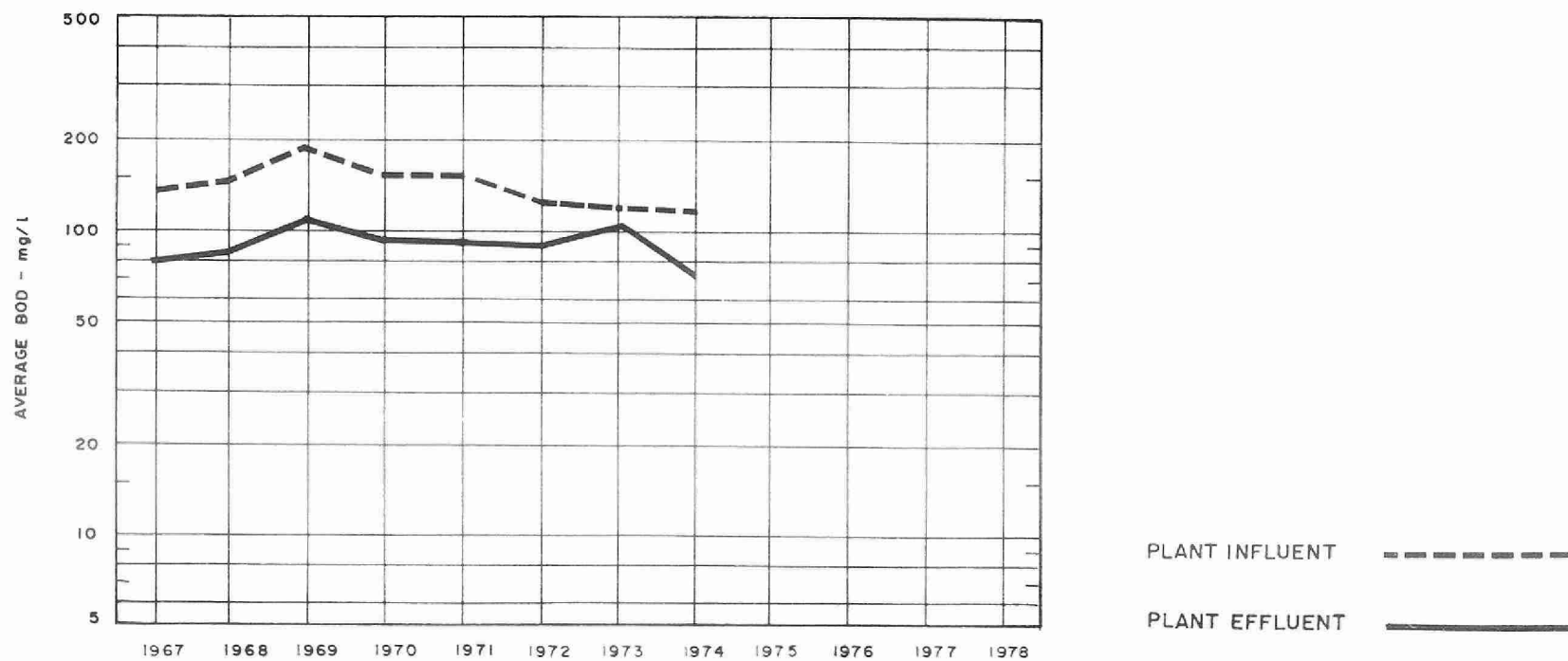
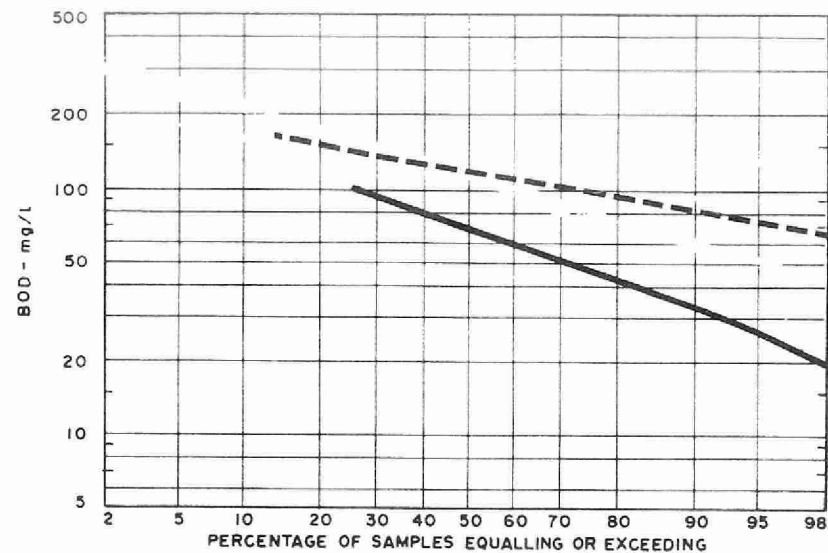


DESIGN CAPACITY - - - - -

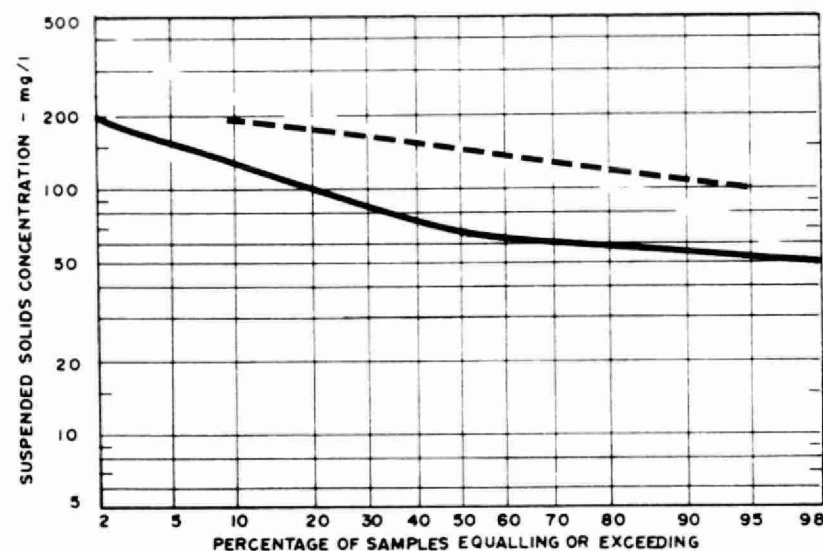
# PLANT PERFORMANCE

MONTH	FLOWS			BIOCHEMICAL OXYGEN DEMAND				SUSPENDED SOLIDS				PHOSPHORUS	
	TOTAL FLOW	AVERAGE DAY	MAXIMUM DAY	INFLUENT	EFFLUENT	REDUCTION		INFLUENT	EFFLUENT	REDUCTION		INFLUENT	EFFLUENT
	million gallons	mil. gal	mgd	mg/l	mg/l	%	10 <sup>3</sup> pounds	mg/l	mg/l	%	10 <sup>3</sup> pounds	mg/l P	mg/l P
JAN	172.25	5.56	6.8	132	104	21	48	132	75	43	98	5.5	4.2
FEB	147.03	5.25	6.2	162	114	30	70	178	90	49	129	4.7	3.1
MAR	159.84	5.16	6.5	129	85	34	70	357	117	67	383		
APR	213.37	7.11	8.0	103	69	33	72	166	103	38	134	6.8	5.1
MAY	238.80	7.70	8.0	101	87	14	33	101	64	37	88	3.8	3.8
JUNE	213.71	7.12	7.9	102	72	29	64	142	84	41	124	3.5	2.7
JULY	192.43	6.21	7.4	92	74	20	35	148	66	55	158	4.5	2.2
AUG	175.73	5.67	6.7	104	75	28	51	129	61	53	119	5.4	3.6
SEPT	184.01	6.13	7.2	94	62	34	59	124	67	46	105	4.7	3.3
OCT	187.16	6.04	7.0	111	53	52	109	135	60	56	140	4.2	3.2
NOV	190.84	6.30	7.2	103	59	43	84	138	57	59	155	6.5	3.6
DEC	191.67	6.18	6.3	133	91	32	81	137	65	53	138	4.7	4.7
TOTAL	2266.84	-	-	-	-	-	816	-	-	-	1813	-	-
AVG.		6.20	MAXIMUM 8.0	114	78	32	68	155	75	52	151	4.9	3.5
No. of Samples	-	-	-	57	58	-	-	58	58	-	-	11	11

# BIOCHEMICAL OXYGEN DEMAND

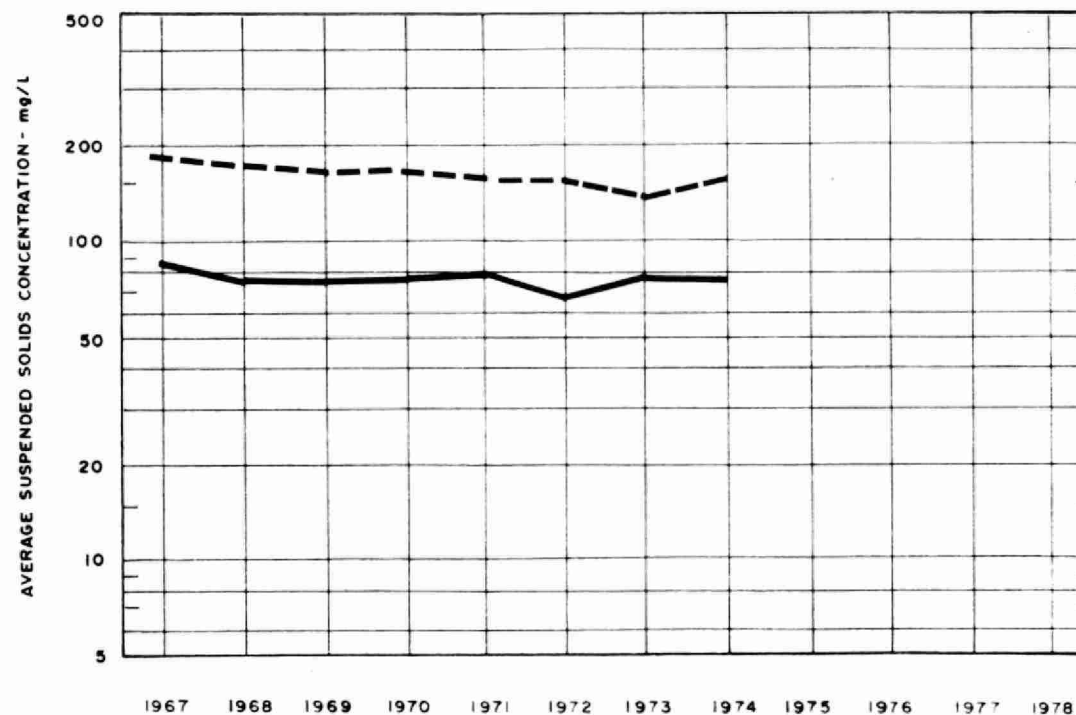


# SUSPENDED SOLIDS

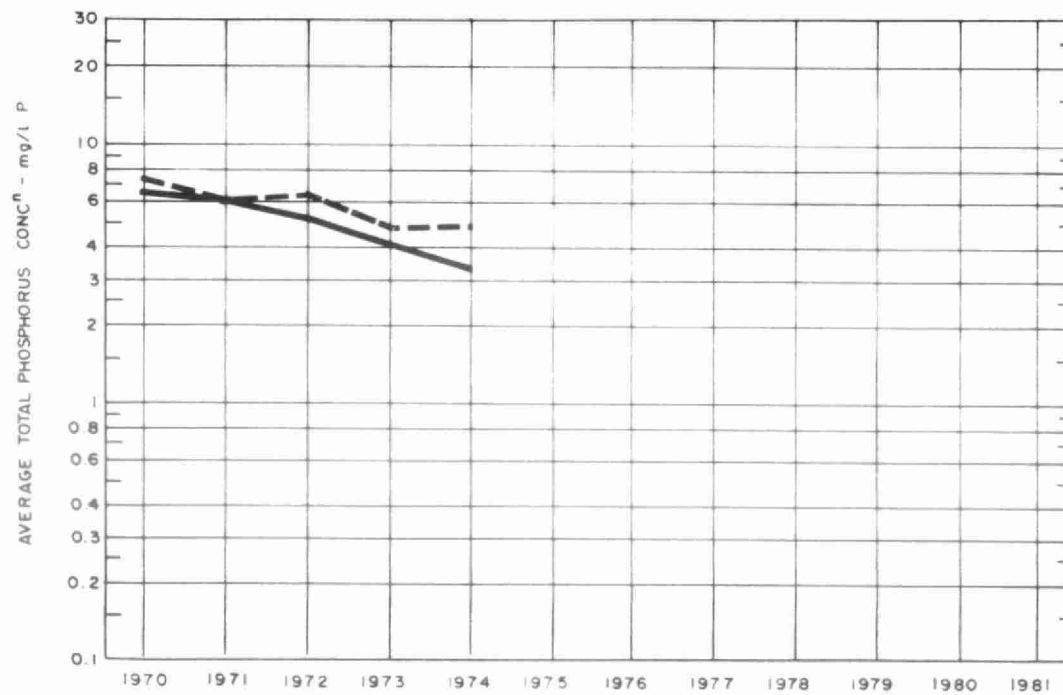
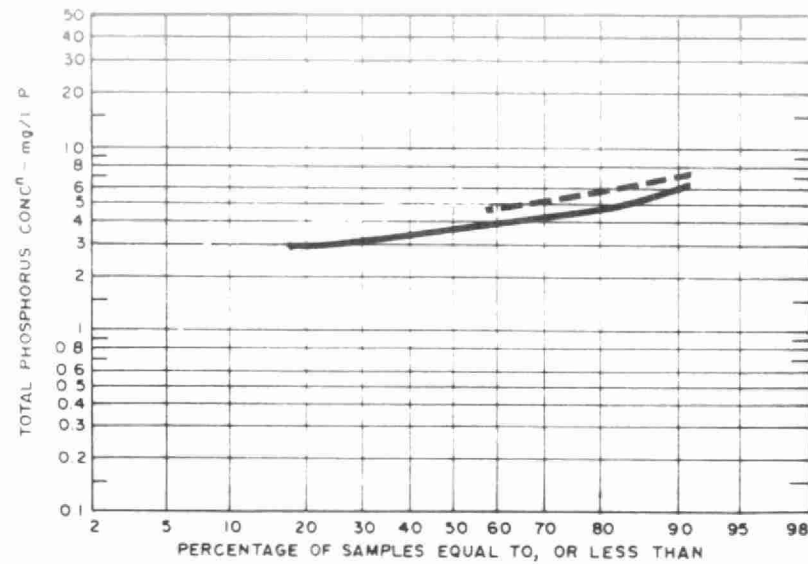


PLANT INFLUENT      - - - - -

PLANT EFFLUENT      —————



# PHOSPHORUS



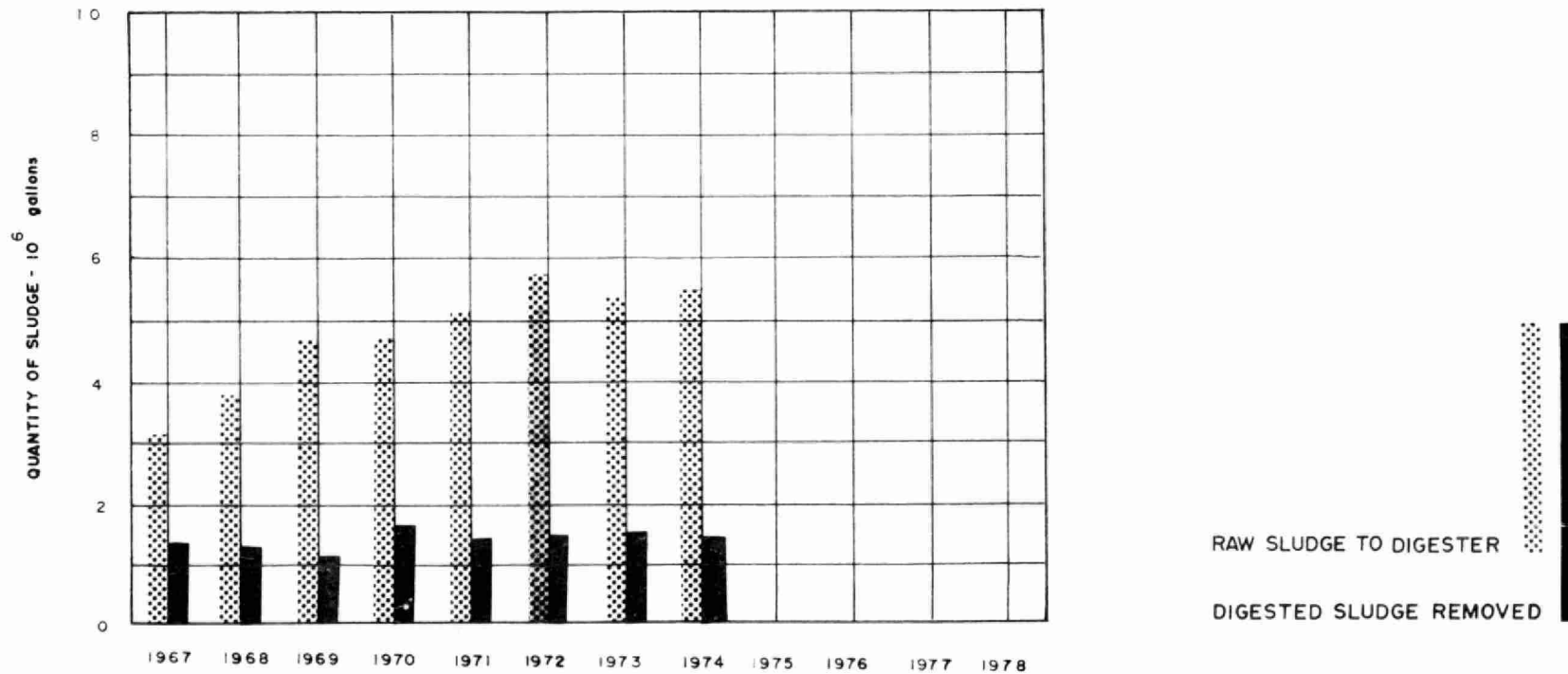
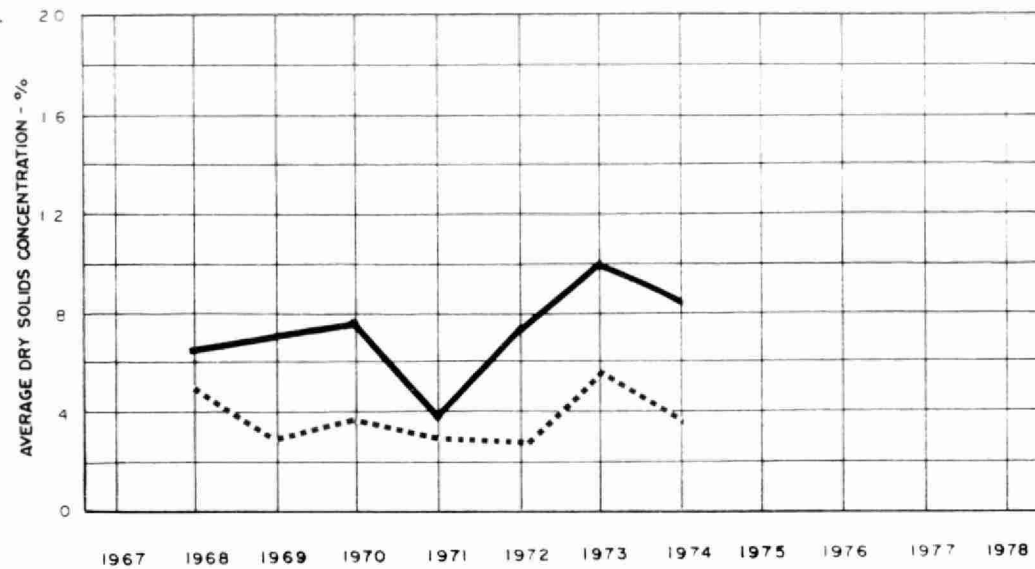
PLANT INFLUENT - - - - -

PLANT EFFLUENT —————



# DIGESTION

RAW SLUDGE .....  
DIGESTED SLUDGE ———



## TREATMENT DATA

MONTH	GRIT	CHLORINATION		SLUDGE DIGESTION and DISPOSAL							
	QUANTITY REMOVED cubic feet	CHLORINE USED 10 <sup>3</sup> pounds	AVERAGE DOSAGE mg/l	RAW SLUDGE			DIGESTED SLUDGE			SUPERNATANT	SLUDGE HAULED cubic yards
				QUANTITY 10 <sup>3</sup> gallons	TOTAL SOLIDS %	VOLATILE SOLIDS %	QUANTITY REMOVED 10 <sup>3</sup> gallons	TOTAL SOLIDS %	VOLATILE SOLIDS %	TOTAL SOLIDS %	
JAN	85	0		439	2.6	82	193	7.3	70		1144
FEB	75	0		520	1.8		28	11.2		.6	165
MAR	105	0		546			67				396
APR	127	1.0	3.4	578	4.3	55	72	9.6		.6	429
MAY	246	7.8	3.2	484	2.9		109	11.9		2.4	649
JUNE	114	7.7	3.5	404	3.5		202	7.3		2.0	1199
JULY	82	8.3	4.3	410	4.6		115	7.9		.6	682
AUG	80	7.9	4.5	442	3.5	73	302	7.9	69	.6	1793
SEPT	98	8.7	4.7	404	4.6	62	133	5.8	44		792
OCT	54	9.0	4.8	428	4.1	78	13	10.7	69	.4	77
NOV	53	4.3	4.7	433	4.1	78	152	8.4	72	.7	902
DEC	59	0	0	517	3.9	79	57	7.0	26	.2	341
TOTAL	1178	54.7	—	5605	—	—	1443	—	—	—	8569
AVG.	.5 cubic feet/mil gal	6.8	4.2	467	3.3	72	120	8.2	58	.9	714

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